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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

BARRY, CHESTER T

ART UNIT PAPER NUMBER

1724

DATE MAILED: 01/30/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/653,732

Applicant(s)

PASZKOWSKI, ANDREW JOSEPH

Examiner

Chester T. Barry

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 and 18-25 is/are pending in the application.
- 4a) Of the above claim(s) 10-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 18-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 September 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

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This application contains claims 10 – 17 drawn to an invention nonelected without traverse in Paper No.. A complete reply to the final rejection must include cancelation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Minor objections to the specification include the followings typographical errors, all of which must be corrected in response to this action:

"my" [sic, "may"] at page 3 line 2;
"SiO2" [sic, "SiO₂"] at page 5 line 9 and at page 7 line 29;
"Nafion®" [sic, "NAFION®"] at page 6 line 23;
"Iler et al." [sic, "Iler et al."] at page 7 line 13;
"nucleii" [sic, "nuclei"] at page 7 line 23;
"60" [sic, "Sixty (60)"] at page 8 line 25;
"0.02m²" [sic, "0.02 m²"] at page 9 line 22;
"0.01m²" [sic, "0.01 m²"] at page 9 line 27;
"Nafion" [sic, "NAFION®"] at page 10 line 7;
"Xantrex" [sic, "XANTREX®"] at page 10 line 9;
"teflon" [sic, "TEFLON®"] at page 10 line 14;
"millipore" [sic, "MILLIPORE®"] at page 10 line 24;
"it too was" [sic, "it, too, was"] at page 10 line 25;
"500ml" [sic, "500 ml"] at page 10 line 26;
"w/w/" [sic, "w/w"] at page 11 line 22;
"an" [sic, "and"] at page 11 line 22;
"w/w)" [sic, "w/w)."] at page 11 line 22;
"CE" [sic, "current efficiency"] at page 12 line 32;
"100ppm" [sic, "100 ppm"] at page 12 line 4;
"200ppm" [sic, "200 ppm"] at page 12 line 4;
"360ppm" [sic, "360 ppm"] at page 12 line 6;
"vs" [sic, "vs."] at page 12 lines 14, 18, 27;
",." [sic, "."] at page 12 line 15;
"FIG's 5 and 6" [sic, "FIG. 5 and FIG. 6"] at page 12 line 18;
"Nafion" [sic, "NAFION®"] at page 12 line 19;
"ESC" [sic, "Electrosynthesis Company"] at page 12 line 20 and page 13 line 15;
"obtains" [sic, "obtained"] at page 12 line 20;
"200mA/cm²" [sic, "200 mA/cm²"] at page 12 line 23 and page 13 line 11;
"350mA/2" [sic, "350 mA/cm²"] at page 12 line 23;
"(FIGs. 7 and 8)" [sic, "FIG. 7 and FIG. 8"] at page 12 line 24;
"Nafion" [sic, "NAFION®"] at page 12 lines 26 and 30 and page 13 line 18;
",." [sic, "."] at page 12 line 27;

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"vs" [sic, "vs."] at page 12 line 28 and page 13 lines 14 and 21;
"6.3ppm" [sic, "6.3 ppm"] at page 13 line 1;
"40%w/w" [sic, "40% w/w"] at page 13 lines 2, 6, and 23;
"10ppm" [sic, "10 ppm"] at page 13 line 2;
"CPC" [sic, ?] at page 13 line 3;
"133ppm" [sic, "133 ppm"] at page 13 line 10;
"Neosepta" [sic, "NEOSEPTA®"] at page 13 line 13;
"32%w/w" [sic, "32% w/w"] at page 13 line 19;
"1..9" [sic, "1.9"] in Fig. 5;
"2.1" [sic, "2.1"] in Fig. 5;
"484.6" [sic, "484-2"] in Fig. 6;
"Mg/L" [sic, "mg/L"] in Fig. 6;
"484.11" [sic, "484-11"] in Fig. 7;
and "[OH}" [sic, "[OH]"] in Fig. 7.

Fig. 2 and Fig. 3 are objected to under 37 CFR 1.84 insofar as the words are blurry, and an insufficiently wide left margin is provided. Fig. 4 is objected to for inconsistencies in noting the run number: Compare 484-2 with 484.6 and 484/31. The art-recognized abbreviation for acid or base "concentration" is "conc." - not "cone" as in Fig. 4. It is unclear what "Mol / mol K⁴" means. Correction is required.

Further objection to the specification for minor informalities results from placement of page 4 line 27 through page 5 line 7, directed to a description of solely the prior art, within the "Detailed Description of the Preferred Embodiment[s]" section of the application. Relocation to the Background section of the application is requested.

The specification is objected to under 35 USC §112(1st) paragraph insofar

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as "Na K₂SO₄" cannot be understood. Is it the molar ratio of Na:K or the molar ratio of Na:K₂SO₄? If the molar ratio of Na:K for a given solution is 2, then the molar ratio Na:K₂SO₄ would be half of that. Correction is required.

Claims 1 – 9, 18 - 25 are rejected under 35 USC §112(2nd) for failing to particularly point out and distinctly claim the subject matter for which patent protection is sought. At issue is the scope of the term "colloidal silica."

Each of independent claims 1, 18, and 22 recited the expression "colloidal silica." Specifically, in each of claims 1, 18, and 22, a quantity of "colloidal silica" is said to be produced by "subjecting [a] quantity of [previously provided] potassium silicate to an ion exchange process to remove a first portion of potassium therefrom." Accordingly, whatever the nature of that ion exchange step, it begins with a quantity of potassium silicate and results in a quantity of "colloidal silica."

An applicant can be his own lexicographer. Applicant provided what on its face appears to be a rather clear, express definition of what he means by "colloidal silica."

Applicant defined "colloidal silica" as follows:

Colloidal silica is a suspension of very small, spherical particles of amorphous (not crystalline) silica suspended in water. The material is colloidal in that the silica particles do not settle out of the solution. The silica particles generally range in size from about 8 nanometers to a maximum size of about 80 nanometers[. Beyond 80 nm,] the silica ceases to be colloidal and begins to settle out of solution.

(Paszkowski, page 1, lines 8-12).

In response to the previous Office action in which claims 1 – 9 reciting “colloidal silica” were rejected,¹ Applicant stated that removal of potassium ions from a quantity of potassium silicate via an ion exchange results in the formation of “colloidal silica.” Further, that “no limitations are implicit in the recitation of the expression ‘colloidal silica’” (Reply filed 11/12/02 at page 3, §2, 2nd paragraph).

In view of the stark inconsistency between the clear, express definition of what applicant regards as “colloidal silica” by the definition of that expression in the specification, and the inconsistent meaning applicant would have us adopt from his remarks filed post-filing, the public would not know with a reasonable degree of precision what the scope of any of claims 1 – 9, 18 – 25² would be should this application issue as a U.S. patent.

The extension of this basis for rejection beyond claims 1 – 9 to claims 18 – 25 is not a new ground of rejection because applicant was given fair notice of the thrust³ of the rejection applied to claims 18 – 25 given the rejection of claims 1 – 9 reciting the expression “colloidal silica,” the apparent presence of the expression of “colloidal silica” in each of claims 18-25 (see independent claims 18 and 22), and the clear parallel

¹ Applicant inaccurately characterized claims 1 – 9 as having been “objected to” in the last Office action. As the Office action mailed 8/9/2002 at page 3 clearly indicated, claim 1 – 9 were “rejected” under 35 U.S.C. §112(2). The distinction is not without a difference: Objections are reviewed by petition while final rejections are appealed. Also, rejected claims are clearly rejected for reasons substantially related to patentability. Arguably, claims merely objected to are not refused for reasons substantially related to patentability.

² Claims 18 – 25 recite the same expression “colloidal silica” as is found in claim 1.

³ See In re Kronig and Scharfe, 190 USPQ 425 (CCPA 1976).

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between the examiner's construction of the term "colloidal silica"⁴ and the applicant's definition at page 1 of his specification.

Claim 5 requires that the previously recited "quantity of colloidal silica consists essentially of silica particles having a size generally between 8 nanometers and 200 nanometers." This phrase renders the claim indefinite in scope on two separate grounds. The Federal Circuit has stated that the phrase "consisting essentially of" does not exclude the addition of another ingredient which does not materially affect the characteristics of the invention. Further, that "consists essentially of" closes the claims to other ingredients that do alter the basic and novel characteristics of the invention. In view of the applicant's definition that colloidal silica is a suspension of silica particles in water, it would appear that limiting the colloidal silica to only the silica particles themselves would indeed alter the claimed invention in a material way, namely, but excluding the presence of water thereby converting the suspension of colloidal silica to a quantity of dry particles. Bear in mind also that colloidal silica is a suspension in the sense that the particles do not settle in water: Without water, it is unclear what colloidal silica is. This basis for rejection could be overcome by amending claim 5 as follows: "quantity of colloidal silica consists essentially of an aqueous suspension of silica particles having a size generally between 8 nanometers and 200 nanometers."

Second, the specification defines the maximum particle size of colloidal silica at 80 nm. Rather specifically, the specification states that particles larger than 80 nm are too big to remain in suspension, and hence, cease to be colloidal. It is unclear how a

⁴ At the ultimate paragraph of page 3 of the 8/9/02 Office action, the examiner stated: "For the purposes

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material comprising particles larger than 80 nm, i.e., particles in the 8 – 200 nm range, can reasonably clearly be referred to as "colloidal silica" if they are not colloidal. It is suggested that "200" be changed to "80."

Claims 18 - 25 are rejected under 35 USC §112(2nd) for failing to particularly point out and distinctly claim the subject matter for which patent protection is sought. At issue is the scope of the terms "potassium salt stream" (as in claims 18 – 22), "potassium salt" (as in claims 22 – 25), and "high purity potassium salt."

The penultimate clause of Claim 18 recites regenerating the "potassium rich" [sic, "potassium-rich"] ion exchange resin with an acid "to produce a potassium salt stream." The specification makes clear that upon said regeneration, in an exemplary embodiment using sulfuric acid as the resin-regenerating acid, it is a *liquid* stream comprising about 5 – 10% dissolved potassium sulfate that results from the regenerating step. See page 5 line 24. Thereafter, as set forth in the final clause of claim 18, the potassium salt stream is subjected to evaporation and crystallization "to remove a portion of sodium [from the potassium salt stream] to produce a quantity of high purity potassium salt." The specification explains that upon subjecting the liquid potassium sulfate solution to evaporation, the potassium sulfate salt crystallizes. As is well known in the chemical arts, crystallization of a salt from an impurity-bearing solution is one way to separate and purify the salt. The initial solution is separated into the less-impure crystal and its more-impure "mother liquor." See, for example, Perry's

of search, [the expression 'colloidal silica'] is construed as an aqueous suspension of amorphous, i.e.,

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Handbook of Chemical Engineering, 5th edition, p.17-1 – 17-18. The skilled artisan would have understood from applicant's disclosure that potassium sulfate could be crystallized from the solution containing less sodium thereby leaving sodium more highly concentrated in the resulting mother liquor (similarly for potassium nitrate using nitric acid).⁵ Accordingly, the skilled artisan would have understood claim 18's recital of "subjecting [the] potassium salt stream [i.e., the potassium salt solution,] to evaporation and crystallization to remove a portion of sodium *therefrom* to produce a quantity of high purity potassium salt" (emphasis added) accomplished removal of a portion of sodium from the solid-phase, i.e., crystallized, potassium salt rather than from the "potassium salt stream" because only the crystallized portion of the potassium salt had less sodium: The mother liquor still contained some solubilized potassium salt and an *increased* concentration of sodium.

On the other hand, the scope of claim 22 is not clearly discernible. Unlike claim 18 reciting a potassium salt *stream*,⁶ claim 22 recites "subjecting [the] quantity of potassium salt to evaporation and crystallization to remove a portion of sodium [from the

non-crystalline, silica spheres not larger than about 80 nm in diameter."

⁵ From the CRC Handbook of Chem. And Phys.,:

Salt	Solubility in g/100 cc	
Sulfates:		
Potassium	12 at 25°C	24.1 at 100°C
Sodium	"soluble" in "cold water"	42.5 at 100°C
Nitrates:		
Potassium	13.3 at 0°C	247 at 100°C
Sodium	92.1 at 25°C	180 at 100°C
Chlorides:		
Potassium	34.7 at 20°C	56.7 at 100 °C
Sodium	35.7 at 25°C	39.12 at 100°C

Conditions at which potassium salt solubility is clearly less than corresponding sodium salt at the same temperature is shown in bold.

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potassium salt].” The skilled artisan would not know how to subject the salt itself – distinct from a preferred “potassium salt solution” or from a less preferably albeit comprehensible “potassium salt stream” – to evaporation and crystallization. It is also unclear what is mean by subjecting the “high purity potassium salt” to electrodialysis and/or electrolysis to produce a high purity stream of potassium hydroxide. The specification supports evaporation of solutions,⁷ electrodialysis,⁸ and electrolysis of solutions,⁹ not “high purity potassium salts.” The sodium concentration of “high purity potassium salts” is not described, but the level of sodium contamination is that which is comparable to no more than the sodium impurity concentration the skilled artisan would find in solid potassium salts crystallized from a 5 – 10% potassium sulfate solution via evaporation (page 5 lines 24-32).

Claims 1 – 9, 18-25 are rejected under 35 USC 103(a) as being obvious over the ZACSIL® E200 brochure or applicants’ admission, further in view of USP 6334880 to Negrych, USP 5458812 to BREKAU, and USP 5352277 to Sasaki and/or USP 3969266 to Iler.

ZACSIL® E200 brand electronics grade ultra pure potassium silicate solution contains less than 100 ppm sodium and was commercially available before applicants invented the claimed subject matter (as admitted at page 4 line 20) (even though

⁶ For example, in the case where the resin regenerant is sulfuric acid, the potassium salt waste stream is a liquid containing 5 – 10% potassium salt (potassium sulfate). See page 5 line 24.

⁷ See page 5 line 31.

⁸ See page 5 line 33.

⁹ See page 6 line 2.

http://www.zaclon.com/pdf/zace200_datasheet.pdf, last revised "Feb. 2002," does not show a date prior to 9/1/2000, the effective filing date of this application).

USP 6334880 to Negrych describes the "well known technique of subjecting potassium silicate solutions to ion exchange to produce ultrafine silica particles suitable for CMP polishing (Negrych col 2 line 15-20). Accordingly, it would have been obvious to have subjected the sub-100 ppm sodium potassium silicate solution of ZACSIL® E200 to an ion exchange process to produce ultrafine silica particles.

USP 5458812 to BREKAU describes ultrafiltration as a means by which high concentration colloidal silica can be produced to accomplish the "obvious" advantage of reduced transportation and storage costs (col 1 line 14). It would have been obvious, therefore, to have ultrafiltered the ion-exchanged silica suggested by Negrych to achieve the obvious advantages of lower transportation and storage costs accomplished through concentration of the silica.

It would have been obvious to have added water during the ultrafiltration concentration step suggested by Brekau in view of Sasaki's or Iler's teaching to wash with water as concentration proceeds via ultrafiltration to maintain the salt concentration below a certain normality to prevent formation of a microgel. See Sasaki column 18 lines 60 or Iler col 2 lines 15-50. The process of diluting with added water while concentrating across a membrane through which the undesired ion is transported is the well-known process called "desalting."

Per claims 18 – 25, it would have been obvious to have regenerated the ion exchange resin and to have recovered the captured potassium ion as a useable substance using known methods.

Claims 1 – 9, 18-25 are rejected under 35 USC 103(a) as being obvious over WO 99/01377 to KEMPRO in view of Bird or Iler '134, in view of USP 5352277 to Sasaki and/or USP 3969266 to Iler.

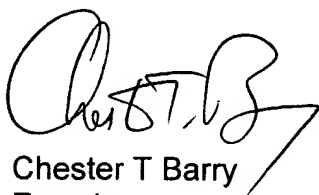
KEMPRO describes cation exchange of a sodium silicate solution followed by ultrafiltration. USP 2244325 to Bird is cited for the suggestion to substitute potassium silicate for any process describing manufacture of colloidal silica from sodium silicate. Similarly, USP 3969266 to Iler is cited for the recognition that any alkali metal silicate can be used (col 2/line 60). Bird or Iler suggests substitution of potassium silicate for sodium silicate as a starting material. Accordingly, it would have been obvious to have substituted potassium silicate for sodium silicate in the process described by KEMPRO.

It would have been obvious to have concentrated a relatively dilute colloidal silica suspension using ultrafiltration and water washing, as suggested by Sasaki or Iler '266. They teach washing with water as concentration proceeds via ultrafiltration to maintain the salt concentration below a certain normality to prevent formation of a microgel. See Sasaki column 18 lines 60 or Iler col 2 lines 15-50.

Per claims 18 – 25, it would have been obvious to have regenerated the ion exchange resin and to have recovered the captured potassium ion as a useable substance using known methods.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

A handwritten signature in black ink, appearing to read 'C. T. Barry', with a stylized flourish extending from the bottom right.

Chester T Barry
Examiner
703-306-5921